Claims

[c1] A radiation detector for a imaging apparatus, said radiation detector comprising:
a scintillator which converts one form of radiation into light; and
an optical routing matrix adjacent to the scintillator to receive light along a plurality of input paths, the optical routing matrix having an output light path and a plurality of optical switches which are electrically operable to selectively direct light from each of the plurality of input paths into the output light path.

[c2] The radiation detector as recited in claim 1 further comprising an optical conduit coupled to the optical routing matrix to receive light traveling along the output light path.

[c3] The radiation detector as recited in claim 1 wherein the optical routing matrix comprises:
a linear array of microelectromechanical mirrors each of which is independently movable to selectively direct light into the output light path; and
a two-dimensional array of microelectromechanical mirrors, each of which is independently movable to selectively direct light from a different one of the input paths to the linear array of microelectromechanical mirrors.

[c4] The radiation detector as recited in claim 1 wherein each of the plurality of optical switches is selected from a group consisting of optical gating elements and microelectromechanical mirrors.

[c5] The radiation detector as recited in claim 1 wherein the scintillator converts x-rays into light.

[c6] An radiation detector for an imaging apparatus, said radiation detector comprising:
a scintillator which converts invisible radiation into light;
a first array of microphotonic switching devices adjacent to the scintillator wherein each one of the microphotonic switching devices receives light from a different section of the scintillator; and
an optical conduit coupled to the two-dimensional array of microphotonic

switching devices;

wherein each of the microphotonic switching devices is independently operable to selectively direct light from the respective section of the scintillator to the optical conduit.

[c7] The radiation detector as recited in claim 6 wherein the microphotonic switching devices comprise microelectromechanical switching elements.

[c8] The radiation detector as recited in claim 6 wherein the microphotonic switching devices comprise microelectromechanical mirrors.

[c9] The radiation detector as recited in claim 6 wherein the first array of microphotonic switching devices comprises:

a semiconductor substrate;

a plurality of electrically steerable mirrors;

a plurality of springs coupling the plurality of electrically steerable mirrors to the semiconductor substrate; and

an plurality of actuator electrodes on the semiconductor substrate, each of which is associated with a given steerable mirror for receiving a drive voltages which causes the given steerable mirror to move with respect to the semiconductor substrate.

[c10] The radiation detector as recited in claim 9 further comprising a sensor for detecting an amount that each of the plurality of electrically steerable mirrors moves with respect to the semiconductor substrate.

[c11] The radiation detector as recited in claim 6 wherein the microphotonic switching devices comprise light gating elements.

[c12] The radiation detector as recited in claim 11 wherein the light gating elements comprise liquid crystal material.

[c13] The radiation detector as recited in claim 6 wherein the first array comprises a two-dimensional array of microphotonic switching devices arranged in a plurality of rows.

[c14] The radiation detector as recited in claim 13 further comprising a second array

of microphotonic switching devices, each being independently operable to selectively direct light from microphotonic switching devices in a row of the first array to the optical conduit.

[c15] The radiation detector as recited in claim 6 further comprising a semiconductor device connected to the optical conduit to convert the light into an electrical signal.

[c16] The radiation detector as recited in claim 6 wherein the scintillator converts x-rays into light.

[c17] An radiation detector for an imaging apparatus, said radiation detector comprising:
a scintillator which converts invisible radiation into light;
an optical conduit; and
an optical routing matrix coupled to the scintillator and the optical conduit and defining a plurality of detection sites in the scintillator, said optical routing matrix having a plurality of optical switches, wherein each one is selectively operable to control flow of light from one of the detection sites to the optical conduit.

[c18] The radiation detector as recited in claim 17 wherein the plurality of optical switches comprise microelectromechanical switching elements.

[c19] The radiation detector as recited in claim 17 wherein the plurality of optical switches comprise microelectromechanical mirrors.

[c20] The radiation detector as recited in claim 17 wherein the plurality of optical switches comprise light gating elements.

[c21] The radiation detector as recited in claim 20 wherein the light gating elements comprise liquid crystal material.

[c22] The radiation detector as recited in claim 17 wherein the plurality of the plurality of optical switches are arranged in a two-dimensional array having a plurality of rows.

[c23] The radiation detector as recited in claim 22 wherein the optical routing matrix further comprises a linear array of optical switching elements, each of which is independently operable to selectively direct light from the optical switches in a row of the two-dimensional array to the optical conduit.

[c24] The radiation detector as recited in claim 17 wherein the optical routing matrix comprises:
a linear array of microelectromechanical mirrors each of which is independently movable to selectively direct light into the optical conduit; and
a two-dimensional array of microelectromechanical mirrors, each of which is independently movable to selectively direct light from a different region of the scintillator toward the linear array of microelectromechanical mirrors.

[c25] The radiation detector as recited in claim 17 wherein the optical switching matrix comprises:
a semiconductor substrate;
a plurality of steerable mirrors;
a plurality of springs coupling the plurality of steerable mirrors to the semiconductor substrate; and
an plurality of actuator electrodes on the semiconductor substrate, each of which is associated with a given steerable mirror for receiving a drive voltages which causes the given steerable mirror to move with respect to the semiconductor substrate.

[c26] The radiation detector as recited in claim 25 further comprising a sensor for detecting an amount that each of the plurality of steerable mirrors moves with respect to the semiconductor substrate.

[c27] The radiation detector as recited in claim 17 wherein the scintillator converts x-rays into light.

Figures